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THE CLASSIFICATION AND GRADING OF COTTON.

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INTRODUCTION.

The present method of grading cotton dates back to about 1800. The grade names were first used in Liverpool, England. Persons in the trade—that is, the cotton merchant, broker (or factor), and the spinner—were about the only ones who classified or graded cotton. The producer rarely knew the grade of his cotton or for what use it was best suited.

Until recently, very few growers have had the opportunity of acquiring such knowledge. Within the last four years almost all of the agricultural schools of the southern United States have added cotton grading to their regular courses of study, besides giving special grading courses in the winter. Field agents of the Farmers' Cooperative Demonstration Work in every cotton-growing State have been supplied with the official grades, and the growers have been able to make use of these to a considerable extent.

Of course, no one can learn to classify all the grades of cotton within a period of six to eight weeks, and it is not necessary for the grower to become familiar with all the grades of cotton that are grown. Often it is enough if he knows only the three grades, Low Middling, Middling, and Good Middling, since this range of grades covers the bulk of the white cotton grown in an average season. By practicing with a full set of types for comparison, a knowledge of the trade "half grades" may be gained, that is, the grades between Good Middling and Middling and between Middling and Low Middling. Such knowledge, coupled with a knowledge of the corresponding market prices, would be very useful to the grower and in the end should encourage him to produce a better quality of cotton and to handle it with more care.

The objects of grading and classifying cotton are to aid (1) in determining the comparative values of the different qualities and (2) in describing the cotton so as to make buying and selling easier when

NOTE.—Names, classifies, and describes the different grades of cotton.

there are no samples. With the present methods of buying cotton, especially the short staple varieties (three fourths of an inch to $1\frac{1}{8}$ inches), other things being equal, the grade practically determines the price that is received by the producer. What is known as staple cotton ($1\frac{1}{8}$ inch staple or above) is usually sold on sample. The sample gives each party to the trade a chance to form his own opinion, and is necessary because cotton dealers and spinners have such different ideas about the character and length of staple.

GRADE NAMES.¹

The grade names that are in more or less general use throughout the United States for what is known as American cotton are as follows:

ABOVE MIDDLING.		BELOW MIDDLING.
1. Fair. 2. Strict Middling Fair. 3. Middling Fair. 4. Strict Good Middling. 5. Good Middling. 6. Strict Middling.	7. Middling.	8. Strict Low Middling. 9. Low Middling. 10. Strict Good Ordinary. 11. Good Ordinary. 12. Strict Ordinary. 13. Ordinary.

The official grades as prepared at present by the United States Department of Agriculture include only nine of these, namely, Middling Fair to Good Ordinary, inclusive. In an average season this range of grades covers practically all the white cotton grown.

The grade names containing the word "strict" are known in the trade as half grades, the others as full grades.² If the order of these names is kept in mind it will help in understanding the descriptions that follow. Middling, as the name shows, is the middle or basic grade, and is the grade upon which the market quotations are based. All grades above Middling bring a higher price and all below Middling bring a lower price than that quoted for Middling, the amount above or below varying according to the respective differences in use where the cotton is marketed.

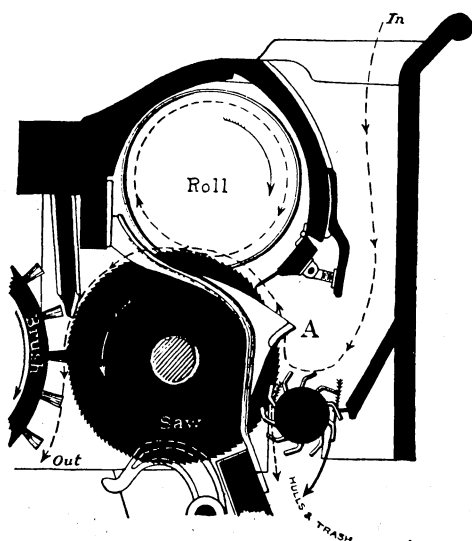
Many more grade names are used by the trade in the large spot markets to describe the different classes of colored cottons. The grades of white cotton, however, are the foundation of all these other classes. When the cotton is not white, its nature is indicated by adding the words "off color" or "fair color," "spotted," "tinged," or "stained," as the case may be, to the grade given to the sample. In other words, there may be several classes of the same grade of cotton; e. g., Middling "off color," Middling "tinged," or Middling "stained."

¹ The grading of Sea Island and Egyptian cotton will not be considered in this bulletin, since the characteristics of these varieties are such that different methods of grading as well as different grade names are used.

² The words "Fully" and "Barely" put before the full grade are sometimes used on the exchanges when speaking of quarter grades. "Fully" means the quarter grade above, while "Barely" means the quarter grade below.

FACTORS THAT INFLUENCE THE GRADE.

The principal points to be considered in deciding the grade of a cotton are (1) foreign matter or impurities (such as leaf, dirt, sand, and also strings, motes, neps, gin-cut fiber, cut seed, and unripe fiber) and (2) color. With cotton that can be classed as white, the amount of foreign matter or impurities is of greater importance than color in determining the grade. It will be seen that grade and value do not run parallel except for cottons that have the same qualities of staple. The cotton merchant, in filling the spinners' orders, must rate the strength, length, pliability, cling, and evenness of the staple as well as the grade. The relative spinning values will be considered apart from the grade.



• **Hulls and trash removed at A**

FIG. 1.—Sectional view of huller gin.

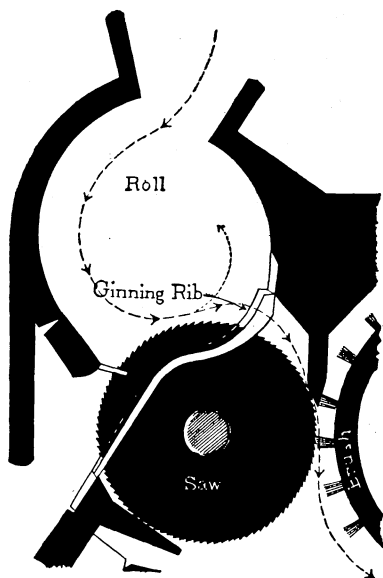


FIG. 2.—Sectional view of plain gin.

FOREIGN IMPURITIES.

Leaf, dirt, and sand.—The amount of leaf, dirt, and sand in the sample depends upon the weather. Usually there is very little leaf when the cotton is picked before the vegetation is killed by frost. The dirt and sand may be caused by either wind or rain. Many of these impurities may be taken out at the gins by the use of cleaners. Fifty pounds or more can very often be extracted from one bale of low-grade cotton. If up-to-date machinery could be used for the whole crop there would be but few bales grading below Low Middling. If, then, the cotton was sold on grade, the increase in price would offset the loss in weight and at the same time the cost for ginning would be reduced. Much of the leaf, dirt, sand, and hulls may be removed by the use of "huller" gins. (See fig. 1.¹) All types of gins (see fig. 2),

¹ All illustrations were prepared with the assistance of Mr. W. E. Chambers, of the Office of Agricultural Technology and Cotton Standardization.

however, turn out cleaner and better samples if the cotton is thoroughly dry when ginned.

Motes.—Motes (fig. 3¹) are immature seeds or ends of seeds that are pulled off in the ginning. Immature seeds are found more or less in



FIG. 3.—Motes. (Enlarged 5 times.)

all cotton, the number depending upon the variety and the weather conditions during its growth and maturity. They go out as waste in the manufacturing processes and their presence lowers the grade.

Neps and cut fibers.—Neps and cut fibers (figs. 4 and 5) may be caused by feeding the gin too fast, by the gin being in bad order, by the presence of unripe fiber, or by dampness in the cotton when ginned. Neps look like small white dots. They may best be seen when a thin layer of the cotton fibers is held toward the light. The cut fibers show in bunches and V-shaped kinks and give the sample

a rough appearance. It is difficult to judge the grade or value of gin-cut cotton; in order to be on the safe side, the buyer often penalizes such cotton from 1 to 3 cents per pound.

Stringy cotton.—Stringy cotton (fig. 6) is defective cotton, produced by ginning wet or unripe seed cotton, or sometimes by a wrong adjustment of the brushes that take the lint away from the gin saws. (See fig. 1.) The fibers in these strings do not separate very easily, while many of them are knocked out in the cleaning processes at the mill, and go into the waste.

Cut seeds.—Cut seeds (fig. 7) are caused by fast ginning with a hard roll and by broken or bent gin-saw teeth that

strike the grate bars. Cut seeds have their effect upon the eye and touch in grading and should be avoided by the ginner.

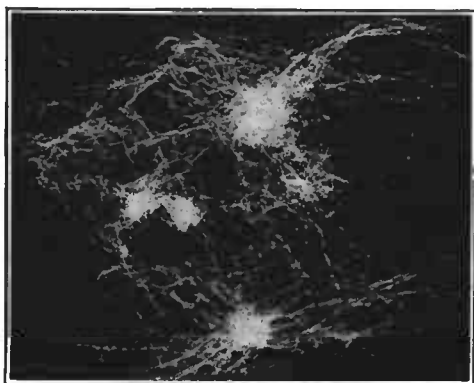


FIG. 4.—Neps. (Enlarged 5 times.)

¹ The microphotographs, figures 3 to 8, inclusive, were made by Dr. Albert Mann, Office of Agricultural Technology and Cotton Standardization.

Unripe fibers.—Unripe fibers (fig. 8) have a glossy appearance and are usually matted together. Bolls of cotton that are picked before they are well opened, and also the top bolls that are forced open by the action of frost, usually contain unripe fibers. These fibers are very weak, and they lower the grade, as does dirt or bad fiber of any kind.

Requirements for satisfactory ginning.—Cotton should be dry when ginned, and the saws, brushes, and other parts of the gin should be in good condition if a smooth sample is to be obtained. Cleaners used in connection with the ginning of low-grade cotton will improve the sample from one to two grades.

COLOR.

The weather and the soil are the factors that influence the color of cotton. The early pickings when not exposed to the rain usually have a bright, creamy color, and if picked with ordinary care should grade Good Middling or better. If left in the field too long, however, the luster is lost and the color of the cotton changed to a "dead" or bluish white that may reduce the grade to Good Middling "off color," or perhaps Middling or below, depending upon the quantity of trash and dirt. A rain may change the same cotton to Middling "tinged" or Middling "stained," according to the kind of soil and the quantity of rain. Weather-tinged and weather-stained cottons are often of a bluish color and when not grown on sandy land generally contain mud spots. The action of frost on the late bolls before they open also causes spots, tinges, or stains, depending upon the amount of colored cotton that

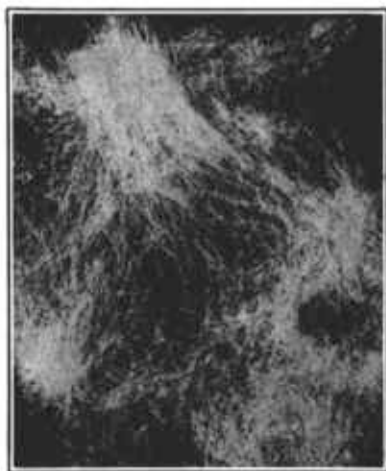


FIG. 5.—Cut fibers. (Enlarged 5 times.)



FIG. 6.—Stringy cotton. (Enlarged 5 times.)

is mixed with the white. This "frost" cotton has a yellowish or buff color and is usually weaker than other tinged cotton, owing to the bolls being forced open before the fiber is fully developed.¹

¹ Earle, D. E. Cotton Grading. Bulletin 2, vol. 4, Clemson Agricultural College extension work.

Cotton picked while wet with dew or soon after rain will contain an excess of moisture. This may cause mildew and thus give the cotton a bluish cast. A bale of cotton left exposed to the weather in the gin yard very often has a mildewed outer surface, or plate,



FIG. 7.—Cut seeds. (Enlarged 5 times.)

and a sample drawn from near the surface of such a bale may not afford a fair representation of its color.

The United States official cotton grades, as well as other grade standards, require that cotton grading Strict Good Middling or above be of a bright creamy or white color and free from any discoloration. A definite or fixed color is not so absolutely required in the grades below Strict Good Middling. For exam-

ple, a Middling may be creamy or dead white, and the same sample might grade below or above Middling, according as it contained more or less impurities. In the grades below Strict Low Middling, however, the creamy color or bloom is lost, since climatic and soil conditions that lower the grade to this extent also affect the color, giving either a dead white, a gray, or a dingy or reddish cast to the lower grades, although they pass commercially as white cotton.

The above variations in color can best be seen when the cotton is placed in north light. (See fig. 14.) If out of doors, the examiner's back should be turned toward the sun, so that his line of vision will be more or less parallel to the rays of light. The best light for grading may be had on a clear day between the hours from 9 a. m. to 3 p. m. It is sometimes hard to judge the color of cotton on a day that is



FIG. 8.—Unripe fibers. (Enlarged 5 times.)

cloudy or partly cloudy, because of reflected light. This difficulty is frequently experienced along a coast where there are numerous clouds. The reflection may be more troublesome when grading near large bodies of water.

SAMPLE FOR GRADING.

In sampling a bale of cotton for grading, about 3 ounces should be drawn from each side of the bale. When the samples are drawn from a bale of compressed cotton they should be allowed to lie for a day before grading, so that the matted condition and deadened color may disappear. Classers are more liberal in grading compressed cotton, because the leaf and dirt are more condensed and the general appearance of the sample is rougher. Samples from bales should be drawn in smooth sheets, and preferably when the bale is dry. In grading, the sample should be unfolded three or four times and examined in its different parts, since the leaf and dirt are not always evenly distributed. This unevenness is largely due to the fact that the cotton in any such sample came from several parts of the field and was perhaps picked by a number of persons. The different pickings made from time to time also are very often stored together, and this may cause a considerable variation, especially during the latter part of the season.¹

Many bales have a thin plate on one side that is of a higher or lower grade than the rest of the bale. This is usually caused by a "roll" being left in the "breast" of the gin from cotton of a different lot previously ginned. The sample from such a bale should therefore be drawn from a sufficient depth to be fairly representative of the bale.

UNITED STATES OFFICIAL COTTON GRADES.

NEED OF UNIFORM GRADES.

There has never been, in the history of the cotton trade, a uniform standard for grading American cotton. This has caused so much trouble and confusion that the question has been discussed at almost every meeting of cotton growers and manufacturers held during recent years. Approximately the same grade names are used in nearly all markets, but they do not have the same meaning. This is confusing to the grower and makes it difficult for him to know what value his crop would have on other markets than his own, because while the same grade names may be employed they are used with different meanings. Middling, for example, has sometimes varied from town to town. Even in the same market it sometimes has had a changed meaning from year to year, to fit the merchants' ideas of what Middling cotton should be for that particular year, their opinions depending upon whether the crop was of a high or low grade. It is most desirable to have a single standard, so that if a bale of

¹ During the season of 1911, Dr. N. A. Cobb, Agricultural Technologist, had some grading investigations made with the entire crop of Louis Fox, Waco, Tex. The crop was from selected "Triumph" seed and was on fairly uniform land. The respective pickings were stored and ginned separately, and the range of grades produced was as follows: Strict Middling, Middling, Strict Low Middling, Low Middling, and Strict Good Ordinary, the difference in the market price at Waco between the extremes being 1½ cents per pound (January 18, 1911).

cotton is Middling in one market it will be a Middling bale in any market in the United States, and, if possible, in any market in the world.

An act of the Sixtieth Congress authorized the establishment by the United States Department of Agriculture of nine official grades of cotton (with Middling as a basis), as follows: Middling Fair, Strict Good Middling, Good Middling, Strict Middling, Middling, Strict Low Middling, Low Middling, Strict Good Ordinary, and Good Ordinary. In February, 1909, the Secretary of Agriculture called upon cotton growers, dealers, manufacturers, and experts to assist in making these grades.¹

This committee was provided with numerous samples of cotton from all sections of the cotton belt and from most of the exchanges in the United States. Each member of the committee was requested to bring with him samples of cotton from his locality or market, and nearly all the members complied with this request. In addition, Liverpool and Bremen sent copies of their standards for reference. This cotton, with the sole exception of the Liverpool grades, was placed entirely at the service of the committee.

The original set of official grades as prepared by this committee was intended to represent American white cotton of good color and fair staple. The cotton used was selected without regard to where it was grown.² In making copies of these grades for sale, the same policy has been continued, and cotton for the official grade boxes has been used from almost every cotton-growing State. There are, however, certain qualities in cotton (to be mentioned later) that usually indicate the section in which the cotton was grown. Each grade box contains 12 samples, so as to indicate the slight range of diversity allowed within the grade. For example, there may be one type of the Low Middling that is of a reddish cast with bright trash, and another that has a gray or bluish cast with blackish trash. In one sample the trash may be in large pieces, while in another it may be broken up in small pieces, known as "pinhead" trash. The same is true to some extent within the grade box of each of the nine official grades, the diversity being less marked above Middling than

¹ The Secretary of Agriculture was assisted in the preparation of the original types by the following committee, it not being intended that its members should represent any particular firm or exchange, but rather the entire cotton interests of the United States:

Mr. Nathaniel N. Thayer, chairman (Barry, Thayer & Co.), Boston, Mass.; Mr. Joseph A. Airey (John M. Parker & Co.), New Orleans, La.; Mr. C. P. Baker (Lawrence Manufacturing Co.), Boston, Mass.; Mr. John Martin, Paris, Tex.; Mr. Lewis W. Parker, Greenville, S. C.; Mr. James Akers (Inman, Akers & Inman), Atlanta, Ga.; Mr. F. M. Crump (F. M. Crump & Co.), Memphis, Tenn.; Mr. George W. Neville (Weld & Neville), New York, N. Y.; Mr. Charles A. Vedder (J. D. Rogers & Co.), Galveston, Tex. This committee, which was unanimous in its recommendation of these grades, was assisted by the following expert cotton classifiers: Mr. W. P. Barbot, of the classification committee, New York Cotton Exchange; Mr. Jules Mazerat, chairman of the classification committee, New Orleans Cotton Exchange; Mr. J. R. Taylor, cotton classifier, A. L. Wolff & Co., Dallas, Tex.

² Cobb, N. A. United States Official Cotton Grades. Department of Agriculture, Bureau of Plant Industry Circular 109. 1913.

below. In the everyday practice of the cotton classer, bales will be encountered that will pass as white cotton which do not really match any particular type in the standard. In such cases the bale is assigned to the nearest equivalent grade.

CARE OF GRADE STANDARDS.

Very few people, even among cotton merchants and spinners, seem to realize the importance of protecting their standards from light and dust. In these standards only the surface of the cotton shows the grade, and exposure to light and dust will in a short time so change the appearance of the surface that it does not accurately represent the grade as certified. A special notice to this effect appears on the outside of each box of official grades. (See fig. 16, p. 23.)

It has been found necessary to compare the "working" standards that are used daily as copies in the preparation of the official grades with the official standard each month. The luster or bloom in the higher grades is bleached out by the light, and this, together with the dust that collects on the cotton, has the effect of lowering the grade, while the bleaching of the lower grades tends to improve their appearance. It is also very desirable to keep the grades stored in a dry place, for moisture will cause the color to darken.

In order to insure a permanent standard, the Department of Agriculture has had 50 sets of the official grades stored in large vacuum tubes, in accordance with a system devised by Dr. N. A. Cobb. In these tubes there is no light to bleach, no air to oxidize, and no moisture to permit mildew or other microscopic growth. The vacuum sets will be opened from time to time for use in preparing "working" standards. Hence there will be no changing of the standard from year to year, as has been the case heretofore.

GRADING BY STANDARDS.

It is easier for beginners to match cotton against the standards if types of the cotton to be graded are placed for the time being in a box similar to the boxes containing the types in the standards. (See fig. 9.) The cotton in question may then be matched by placing the prepared box of cotton to be graded by the side of the respective boxes of standard grades until the grade is determined. This method gives a greater surface for comparison, and also practically the same light on each box, a very important matter. When samples are held in the hands while grading, great care should be taken not to hold them over the standard grades; otherwise dirt, sand, and trash falling from the loose sample upon the standards will very quickly spoil the latter.

When the building in which the grading is to be done is not suited for adding a skylight (see fig. 10), four or five large windows may be placed side by side in the wall on the north side if the room has a ceiling 10 or 12 feet high.

The table for holding the grade boxes should have a top inclining toward the light at an angle of approximately 30 degrees where a skylight is used, and at about 45 degrees where the side light is used.

Such use of the grades is being made at a number of places, and in some cases daily price quotations are obtained for use in connection

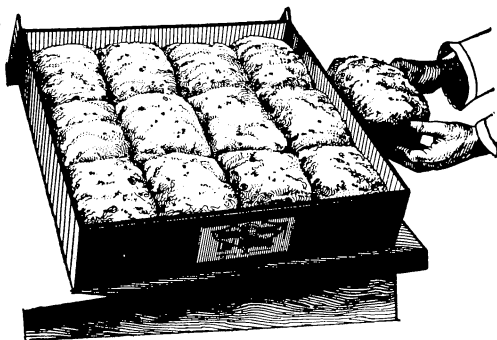


FIG. 9.—Grading by standards.

with the grades. This method of displaying the grades gives the grower a chance to find out about what grade of cotton he has for sale, without his having to own a set of grades.

When using the grades, one should be careful not to leave them open to any except a north light, if possible. This light is more even than others and not as hard on the grades. The lids of the grade boxes should be kept open only while the comparison is being made.

COMPARISON OF AMERICAN AND EUROPEAN STANDARDS.

The full grades in both American and European usage are as follows:

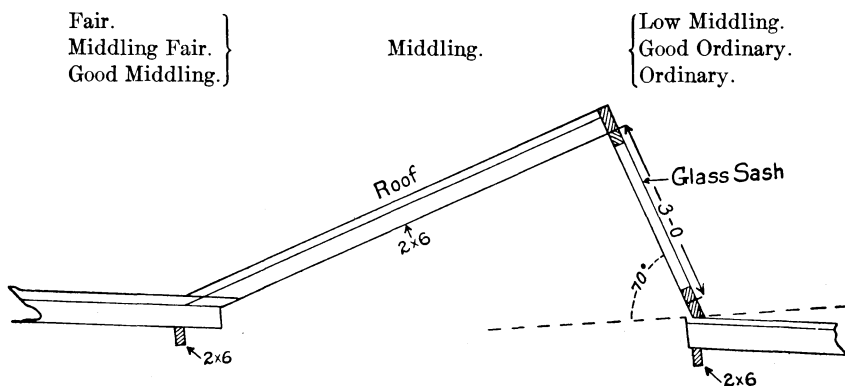


FIG. 10.—Sectional view of a skylight that may be placed on the roof of a warehouse or cotton shed, in order to get a north light for grading.

By adding the prefix "Strict" to each of these full grade names the American half grades are formed:

Fair. Strict Middling Fair. Middling Fair. Strict Good Middling. Good Middling. Strict Middling.	}	Middling.	{	Strict Low Middling. Low Middling. Strict Good Ordinary. Good Ordinary. Strict Ordinary. Ordinary.
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In the same way "Fully"¹ added to each of the full-grade names will give the European half grades:

Fair.
Fully Middling Fair.
Middling Fair.
Fully Good Middling.
Good Middling.
Fully Middling.

Middling.

Fully Low Middling.
Low Middling.
Fully Good Ordinary.
Good Ordinary.
Fully Ordinary.
Ordinary.

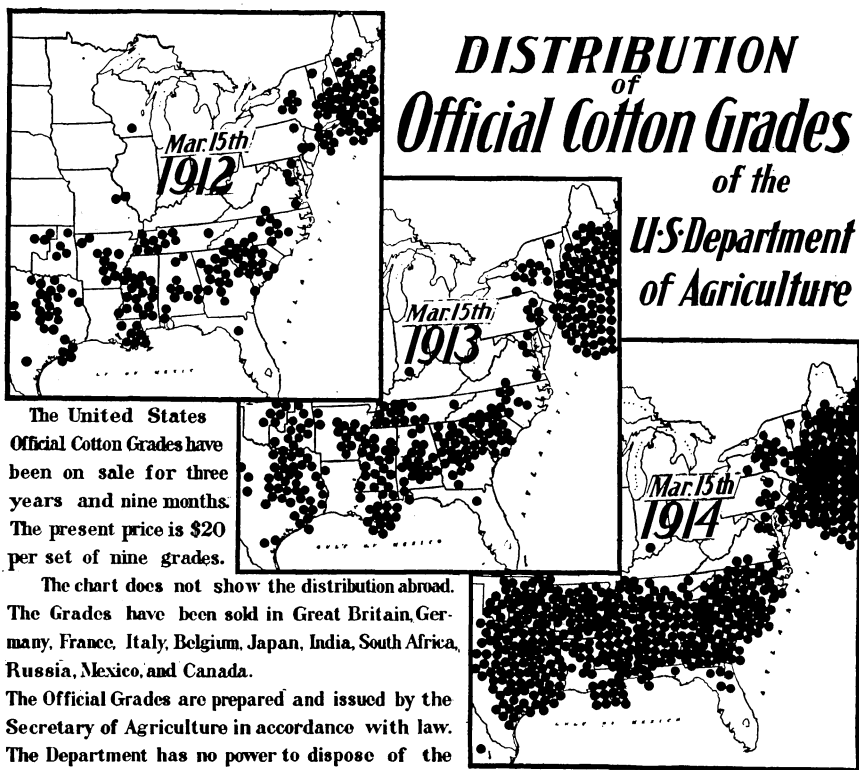


FIG. 11.—Map of the eastern portion of the United States, showing the distribution of the United States official cotton grades. The locations of copies issued by private parties are not shown. Including these, about 2,000 sets of the grades are in use.

In other words, in European usage the words "Fully" and "Strict" are interchanged as compared with their use in America. The word "Barely" is used in the same way both here and in Europe; that is, to represent the quarter grade below, as "Barely Middling."

The United States standard grades have been distributed throughout the cotton growing and manufacturing States (fig. 11) and

¹ The American quarter grade above.

officially adopted by the following cotton exchanges and associations:

New Orleans.	Little Rock.	New York.
Memphis.	Galveston.	New England Buyers.
St. Louis.	Macon.	Arkwright Club.
Charleston.	Mobile.	Southern Cotton Buyers.
Natchez.	Oklahoma.	Fall River Cotton Buyers.

These standard grades have also been adopted by others that have not gone through the formality of a special vote. In a number of markets exporters sell to the European mills on the European (Liverpool) classification. This is, of course, unfortunate, and it is hoped that in time an international standard may be agreed upon.

In June, 1913, representatives of the American and European cotton exchanges met at Liverpool, and at this conference the Liverpool Exchange agreed to widen the differences between their lower grades, to become effective September 1, 1914, so as to conform more nearly to the grades of the United States standard. There is, however, more color and contrast in the lower grades (Fully Low Middling to Ordinary, inclusive) in the new Liverpool standard than in the United States standard. Liverpool Fully Low Middling has one type among the twelve that is tinged, while the Low Middling as a whole is grayer than the United States standard. The Liverpool Fully Good Ordinary and Good Ordinary have four or five types in the twelve that are "off color" as compared with the United States standard. The European usage of the word "Fully" instead of "Strict," as used in America, has been retained in the new Liverpool standard. In this connection it should be noted that the grades above Middling are very much the same in each standard.

The new Liverpool standards evidently contain some cotton that has been ginned with less care than that used in the preparation of the United States standard. The pressure of the box lid on the Liverpool types also gives the respective grades the appearance of having more leaf than would otherwise be the case.

The name of each of the new Liverpool standards (effective September 1, 1914) is placed opposite the name of the United States standard to which it most nearly conforms.

UNITED STATES STANDARD.

Middling Fair.
 Strict Good Middling.
 Good Middling.
 Strict Middling.
 Middling.
 Strict Low Middling.
 Low Middling.
 Strict Good Ordinary.
 Good Ordinary.

NEW LIVERPOOL STANDARD.

Middling Fair.
 Fully Good Middling.
 Good Middling.
 Fully Middling.
 Middling.
 Fully Low Middling (1 tinged type).
 Low Middling (grayer).
 Fully Good Ordinary (off color).
 Good Ordinary (off color).
 Ordinary.

GRADE CHARACTERISTICS OF DIFFERENT GROWTHS.

There are certain grade characteristics in cotton that often indicate the section of the country in which the cotton was grown. The sections most commonly referred to in the American cotton industry are three in number and give rise to cotton of three regional types—Upland, Gulf, and Texas cotton. Each of these, however, is subdivided and passes under many trade names that more nearly tell the character of the cotton and where it was grown.

Upland cotton.—The Upland type of cotton constitutes the bulk of the American crop and is perhaps the most useful cotton grown. It is produced almost throughout the inland districts of the cotton-growing States, but chiefly in North Carolina, South Carolina, Georgia, Alabama, Tennessee, and Virginia. Much cotton that is grown in the hilly parts of Mississippi, Louisiana, and Arkansas is sold as Upland. This cotton averages seven-eighths of an inch to an inch in length, although a number of long-staple varieties up to $1\frac{5}{8}$ inches in length are being successfully grown in the Upland districts. In parts of the Piedmont section, shown on the soil map (fig. 12) by the letter *D*, the length is very often more than an inch, while in the sand hills (fig. 12, *C*), it may be less than seven-eighths of an inch. Cotton grown in the Piedmont section generally has a bright, creamy color, or “bloom,” that is considered desirable by many spinners. The leaf is usually black and in rather small pieces, while in the cotton from the sandy soil the color is generally whiter and the leaf larger and brighter. Atlantic States cotton changes color faster when left in the field than Western cotton. It takes on a bluish cast and is often spotted or tinged if grown on a red clay soil. This is no doubt due, in part at least, to the rainfall being greater in the Eastern States than in the Southwest during the gathering season. (See fig. 13.)

Gulf cotton.—As the name indicates, Gulf cotton is grown in the States bordering on the Gulf of Mexico and in the basin of the Mississippi River. In using this name, many in the trade seem to refer to a cotton of $1\frac{1}{8}$ -inch staple or something better than the ordinary seven-eighths of an inch to an inch Upland cotton, regardless of whether it is grown on the Gulf or not. The length of staple, however, does not decide the grade or the regional trade name, for a considerable quantity of $1\frac{1}{8}$ -inch to $1\frac{1}{2}$ -inch cotton is grown in the Upland districts. The general color of Gulf cotton is whiter and the leaf often larger and blacker than that in either Upland or Texas cotton.

The word “Gulf” is not much used in the actual buying and selling of cotton, other trade names that have a more definite meaning being employed. The most common of these trade names are

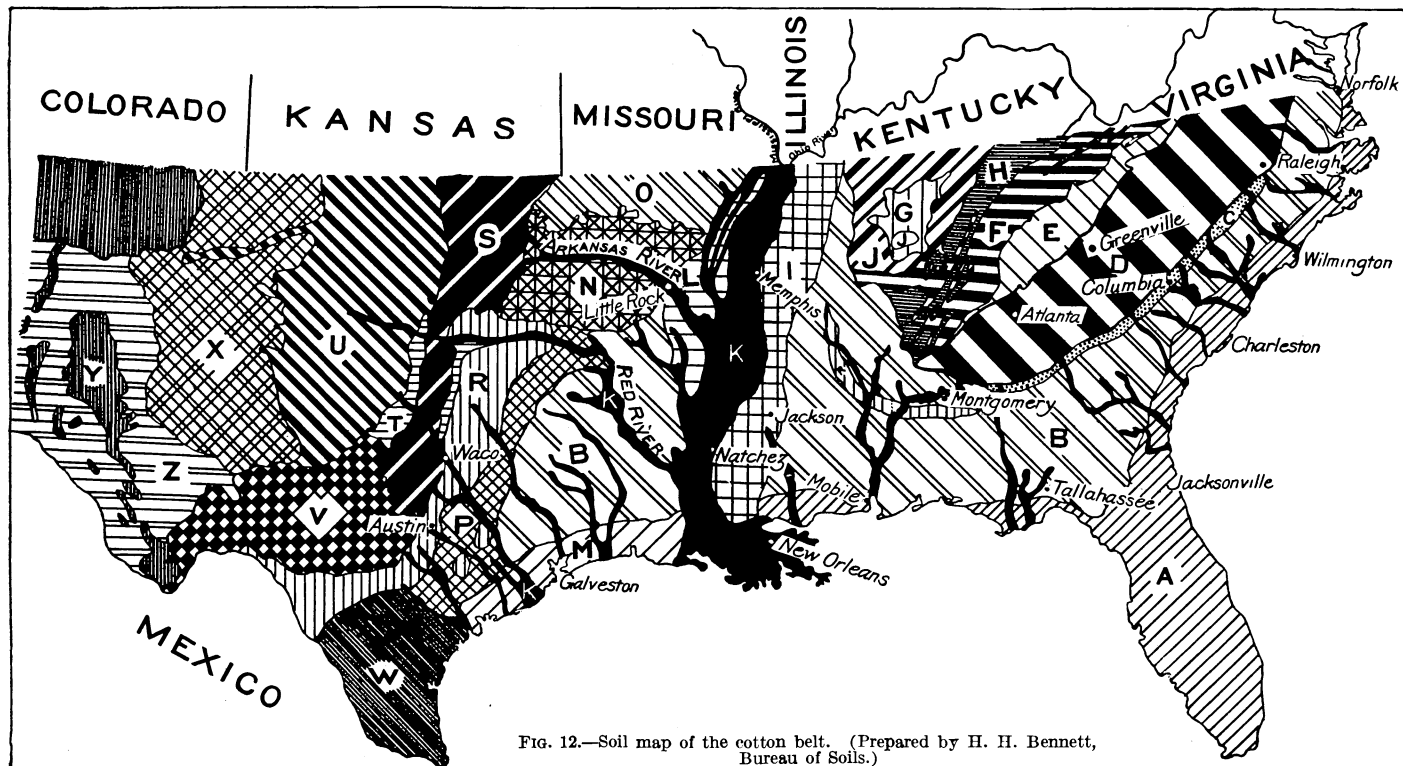


FIG. 12.—Soil map of the cotton belt. (Prepared by H. H. Bennett, Bureau of Soils.)

EXPLANATION.—A, Atlantic and Gulf flatwoods. Light-colored sands and dark, poorly drained soils predominate. B, Interior Atlantic and Gulf coastal plains. C, Sand hills. D, Piedmont plateau. I, Loessial region, silt and loam. K, River flood plains, subject to overflow. L, Silty terrace lands. M, Coastal prairie, low flatland, marshy near coast. N, Ozark and Ouachita Mountains. P, Coastal plain, mixed "post-oak land" and prairie. R, Black prairie, calcareous black-waxy lands. S, Black prairie, sandstone, shale, and limestone. U, Red prairie, sandstone, and shale soils. "Red Beds" region. V, Edwards and Stockton plateaus. W, Rio Grande plain. X, Staked plain.

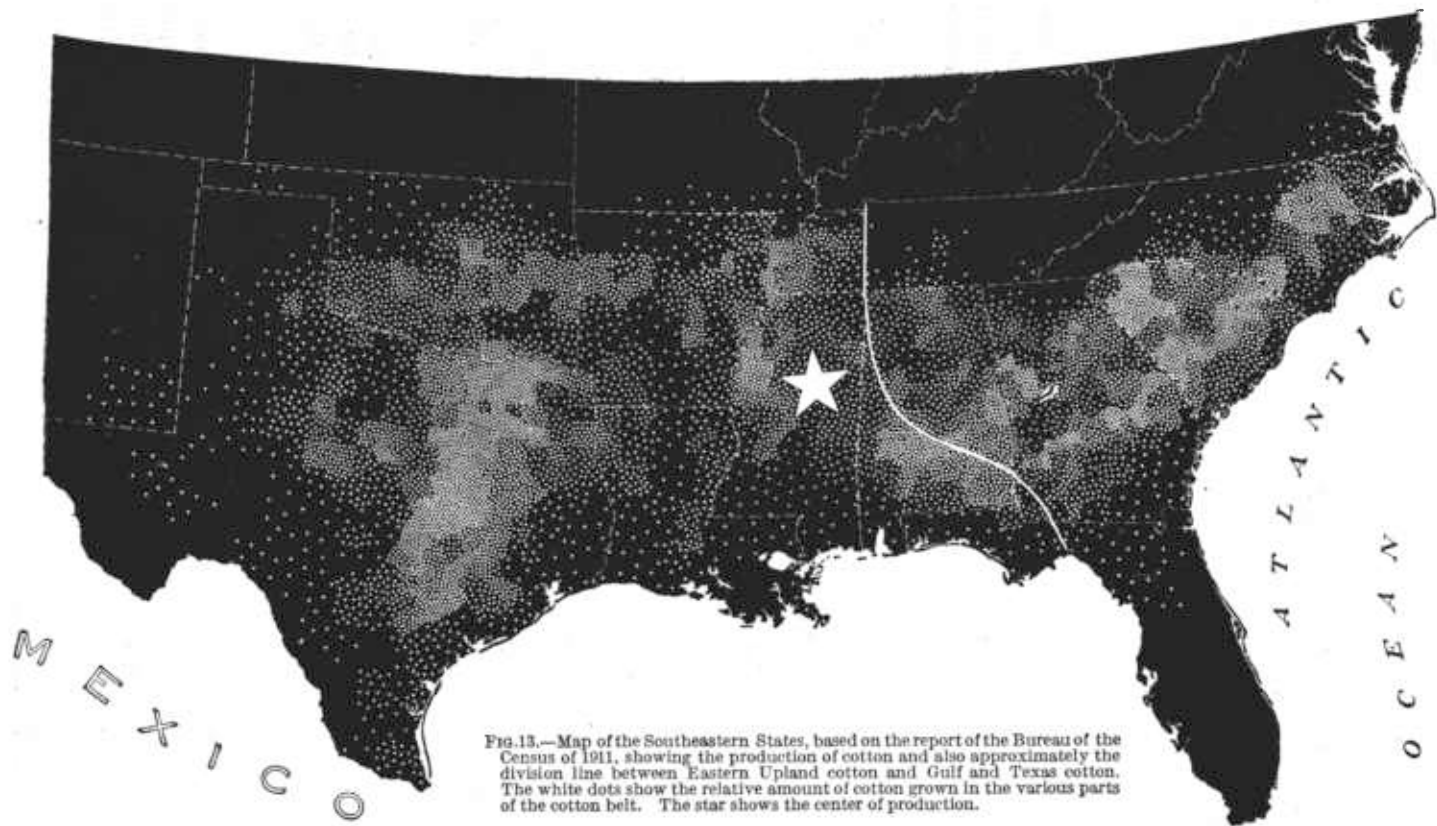


FIG. 13.—Map of the Southeastern States, based on the report of the Bureau of the Census of 1911, showing the production of cotton and also approximately the division line between Eastern Upland cotton and Gulf and Texas cotton. The white dots show the relative amount of cotton grown in the various parts of the cotton belt. The star shows the center of production.

Peelers, Benders, Rivers, Canebrake, and Red River, although a number of so-called varieties may be sold under each of these names.

"Peelers" was formerly a varietal name, but it is now applied rather indiscriminately to most of the $1\frac{1}{4}$ -inch Mississippi Delta cotton.

"Benders" is not a varietal name. It is applied to $1\frac{3}{8}$ -inch cotton of good body that is grown along the Mississippi, Arkansas, and White Rivers. The word is said to have applied originally only to cotton that grew in Mississippi, Louisiana, and Arkansas along the bends of the Mississippi River.

"Rivers" is used in referring to cotton having a staple of $1\frac{1}{8}$ to $1\frac{1}{2}$ inches, though if the cotton has a light body it is sometimes called "Creeks."

"Canebrake" is the name applied to cotton that is grown in the south-central part of Alabama on the strip of black prairie land shown on the soil map (fig. 12) by the letter *R* (small). Most of this cotton has a strong $1\frac{1}{8}$ -inch staple and brings a higher price than other Alabama cotton.

Texas cotton.—"Texas" is the trade name given to cotton grown in Texas and Oklahoma. This generally has about the same length of staple as Upland cotton except in the river basins and black prairie, where the length is usually $1\frac{1}{8}$ inches. The character of the fiber of Texas cotton varies considerably from year to year. When the growing season is dry, the fiber is harsher and shorter, while the color may have a reddish tinge. Many of the leaves are dried up early in the picking season by the heat and drought. This, no doubt, accounts for the trash in this cotton being of a brighter color and more broken or peppery than in either the Gulf or Atlantic States cotton. A large quantity of boll hulls, shale; and stalk is often found in this growth of cotton, especially in Oklahoma and northern Texas, where all of the top crop does not mature, owing to the shorter growing season. These half-opened bolls and the bolls that do not open at all are usually ginned on a "double-rib" huller gin, and the cotton is known in the trade as "bollies." Another type of cotton where the open and mature bolls have been gathered with the burr is found in this section near the end of the picking season. This cotton, although often resembling bollies, has a superior fiber and may be graded in the usual way.

RELATIVE VALUES OF DIFFERENT GRADES.¹

The relative values of the grades of sound white cotton, other characteristics being equal, depend chiefly upon the quantity of dirt and trash, etc., that goes to waste in the manufacturing process. The difference in price, however, will vary also in accordance with supply

¹ Experiments are now being made in the Office of Agricultural Technology and Cotton Standardization to determine the quantity of waste, the tensile strength, and the bleaching qualities of the grades as standardized by the United States Government.

and demand. During a season when the grades above Middling are scarce, their premium on the price of Middling is raised, while the penalty on the grades below Middling is also greater. Table I shows the quotations at various markets on February 2, 1914, for Low Middling, Middling, and Good Middling short-staple cotton based on the United States standard of classification, while figure 15 shows the relative amount of trash in these grades.

TABLE I.—*Quotations, based on the United States standard, at different markets for the same grades of short-staple cotton, February 2, 1914.*

Market.	Low Middling.	Middling.	Good Middling.
	<i>Cents.</i>	<i>Cents.</i>	<i>Cents.</i>
New Orleans.....	12.06	12.81	13.69
Galveston.....	11.44	12.87	13.69
Memphis.....	12.63	13.25	13.75
Mobile.....	11.56	12.69	13.19
Charleston.....	11.75	12.75	13.25
St. Louis.....	12.25	13.25	13.88
Little Rock.....	11.50	12.50	13.00

The reader will note that a given grade is quoted on the same day at different prices in the various markets. This difference in price may be due to a number of causes: (1) The difference in the character of the cotton that is marketed at the various points, (2) the facilities of the market as a shipping point to the eastern or European mills, (3) the different ways in which the official quotations are made by the respective markets, and (4) the supply and demand for the different grades. There is a greater difference between the prices quoted for Low Middling than for Middling, which is partly due, no doubt, to differences of opinion in the trade as to the relative values of the various grades in comparison with Middling.

Most of the cities named are concentration points, that is, places to which the cotton from the near-by smaller markets is sent. The basic price paid in the surrounding small, or primary, markets where the cotton is bought direct from the growers would, of course, be less, depending, among many other things, upon the local buyers' knowledge of cotton,¹ as well as the necessary cost for transporting the cotton to the concentration points.

COMMERCIAL DIFFERENCES IN THE NEW ORLEANS SPOT MARKET.

Table II shows what a complex question the classification of cotton is in the large spot markets, where all of the different grades and classes of cotton are found. The white grades are used as the standard, and the respective classes of colored cottons are shown for a particular day as so much off the price of the respective white grades.

¹ Mr. Charles J. Brand, in charge of the Office of Markets, had a survey made of the primary markets in Oklahoma in the season of 1913. He found that on the same day and at the same point the lower grades of cotton very often sold for better prices than did the higher grades, as well as vice versa.

TABLE II.—*Quotations on the various grades of short-staple cotton when off color, spotted, tinged, or stained at New Orleans, May 9, 1914.*

Grade.	Stand- ard.	Off color.	Spotted.	Light tinged.	Tinged.	Light stained.	Stained.
	<i>Cents.</i>	<i>Cents.</i>	<i>Cents.</i>	<i>Cents.</i>	<i>Cents.</i>	<i>Cents.</i>	<i>Cents.</i>
Low Ordinary.....	a 8 $\frac{1}{8}$	} $\frac{3}{8}$ off.	} 1 off.	} 1 $\frac{1}{2}$ off.	} 1 $\frac{1}{2}$ off.	} 1 $\frac{3}{8}$ off.	} 1 $\frac{3}{8}$ off.
Ordinary.....	a 9 $\frac{1}{8}$						
Good Ordinary.....	11 $\frac{1}{8}$	} $\frac{5}{8}$ off.	} $\frac{3}{8}$ off.	} $\frac{3}{8}$ off.	} 1 off.	} 1 $\frac{3}{8}$ off.	} 1 $\frac{3}{8}$ off.
Strict Good Ordinary.....	11 $\frac{1}{2}$						
Low Middling.....	12 $\frac{1}{8}$	} $\frac{1}{2}$ off.	} $\frac{3}{8}$ off.	} $\frac{3}{8}$ off.	} 1 off.	} 1 $\frac{3}{8}$ off.	} 1 $\frac{3}{8}$ off.
Strict Low Middling.....	13						
Middling.....	13 $\frac{1}{8}$	} $\frac{1}{2}$ off.	} $\frac{1}{2}$ off.	} $\frac{1}{2}$ off.	} $\frac{5}{8}$ off.	} $\frac{1}{2}$ off.	} 1 $\frac{1}{2}$ off.
Strict Middling.....	13 $\frac{3}{8}$						
Good Middling.....	13 $\frac{1}{2}$	} $\frac{1}{2}$ off.	} $\frac{1}{2}$ off.	} $\frac{1}{2}$ off.	} $\frac{5}{8}$ off.	} $\frac{1}{2}$ off.	} 1 $\frac{1}{2}$ off.
Strict Good Middling.....	14 $\frac{1}{8}$						
Middling Fair.....	a 14 $\frac{1}{8}$	} $\frac{1}{2}$ off.	} $\frac{1}{2}$ off.	} $\frac{1}{2}$ off.	} $\frac{5}{8}$ off.	} $\frac{1}{2}$ off.	} 1 $\frac{1}{2}$ off.
Middling Fair to Fair.....	a 14 $\frac{3}{8}$						
Fair.....	a 15 $\frac{1}{8}$	} $\frac{1}{2}$ off.	} $\frac{1}{2}$ off.	} $\frac{1}{2}$ off.	} $\frac{5}{8}$ off.	} $\frac{1}{2}$ off.	} 1 $\frac{1}{2}$ off.

a Nominal.

COMMERCIAL DIFFERENCES AT NEW YORK.

On the New York Cotton Exchange the grade differences were formerly fixed three times each year—in September, November, and February. The exchange rules have been recently revised to provide for a monthly revision of grade differences, beginning September 9, 1915.

The United States standard grades have been adopted by the New York Exchange, and are now (May 1, 1914) being used for new contracts. The grade differences based on the official standards, however, have not as yet been fixed.

RELATIVE VALUE OF DIFFERENT LENGTHS OF STAPLE.

Long-staple cotton, with the exception of Sea Island and Egyptian cotton, is graded in practically the same way as short-staple cotton, although graders are usually more liberal as regards curls, strings, and general smoothness of the cotton. The reason for this is that in ginning staple cotton with either the saw or roller gin the fibers become more tangled, forming curls and strings which affect the general smoothness of the cotton. Another reason is that the length of long-staple cotton is mainly what decides the price. The buyer looking for a lot of cotton with a desired length of staple will not be as particular with the grade as with the staple.

It is usual in the trade to call cotton that averages in length of staple 1 $\frac{1}{8}$ inches or more "staple cotton," and that less than 1 $\frac{1}{8}$ inches "short-staple cotton." There is no fixed length of staple used as a basis in many of the markets for what is known as short cotton. Almost no difference is made by local buyers in the price between different lengths of cotton ranging from seven-eighths of an inch to 1 $\frac{1}{8}$ inches if the grade and quality are equal. One-inch cotton, however, is worth perhaps just as much more above seven-eighths-inch cotton as Good Middling is worth above Middling and should bring a cor-



FIG. 14.—Laboratory in which the official grades are prepared, showing skylights with northern exposure.

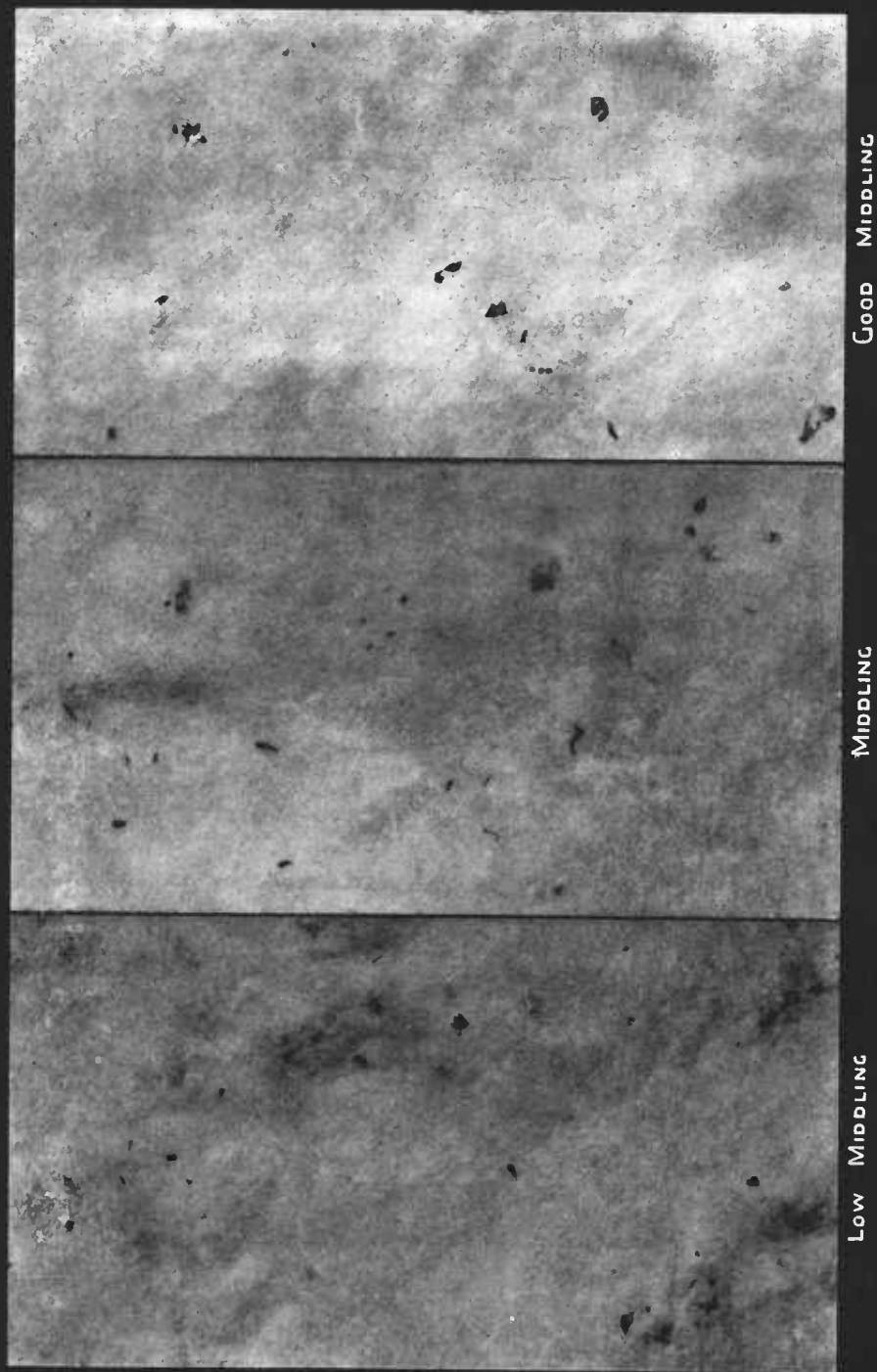


FIG. 15

responding premium. We believe it is only a question of time when closer distinctions will be made in this respect.¹

Table III shows quotations from responsible firms at New Orleans and Vicksburg, respectively, on April 1, 1913, for the various grades and lengths of staple above 1 inch.

TABLE III.—Quotations on the various grades of cotton having lengths of staple of 1 inch or more, at New Orleans and Vicksburg, April 1, 1913.

Grade.	New Orleans.										Vicksburg.							
	1	1 $\frac{1}{8}$	1 $\frac{1}{4}$	1 $\frac{3}{8}$	1 $\frac{1}{2}$	1 $\frac{5}{8}$	1 $\frac{3}{4}$	1 $\frac{7}{8}$	1 $\frac{1}{2}$		1	1 $\frac{1}{8}$	1 $\frac{1}{4}$	1 $\frac{3}{8}$	1 $\frac{1}{2}$	1 $\frac{5}{8}$	1 $\frac{3}{4}$	1 $\frac{7}{8}$
Middling Fair.....	13 $\frac{3}{4}$										12 $\frac{3}{4}$	12 $\frac{1}{2}$	14 $\frac{1}{4}$	15 $\frac{1}{4}$	17	18	20	
Strict Good Middling.....	12 $\frac{3}{4}$	14	16 $\frac{1}{2}$								12 $\frac{1}{2}$	12 $\frac{1}{4}$	14	15 $\frac{1}{2}$	16 $\frac{1}{2}$	17 $\frac{1}{2}$	19 $\frac{1}{2}$	
Good Middling.....	12 $\frac{1}{2}$	13 $\frac{1}{2}$	16	17	18	19 $\frac{1}{2}$	21	22	22 $\frac{1}{2}$		12 $\frac{1}{2}$	12 $\frac{1}{4}$	14	15 $\frac{1}{2}$	16 $\frac{1}{2}$	17 $\frac{1}{2}$	19 $\frac{1}{2}$	
Strict Middling.....	12 $\frac{1}{4}$	13 $\frac{1}{4}$	15 $\frac{1}{4}$	16 $\frac{1}{4}$	17 $\frac{1}{4}$	19	20 $\frac{1}{4}$	21 $\frac{1}{4}$	22		12 $\frac{1}{4}$	12 $\frac{1}{8}$	13 $\frac{3}{8}$	15	16 $\frac{1}{8}$	17 $\frac{1}{8}$	18 $\frac{3}{4}$	
Middling.....	12 $\frac{1}{8}$	12 $\frac{1}{8}$	15	16	17	18	19	20	20		11 $\frac{3}{4}$	12 $\frac{1}{8}$	13	14	15	16	17	
Strict Low Middling.....	12 $\frac{1}{8}$	12 $\frac{1}{8}$	14	15	16	17	18	19	19		11 $\frac{3}{4}$	11 $\frac{1}{2}$	12 $\frac{1}{2}$	13 $\frac{1}{2}$	14 $\frac{1}{2}$	15 $\frac{1}{2}$	16 $\frac{1}{2}$	
Low Middling.....	11 $\frac{3}{4}$	12 $\frac{1}{4}$	13	14	15	16	17	18	18		11 $\frac{3}{4}$	11 $\frac{1}{4}$	11 $\frac{1}{2}$	12 $\frac{1}{4}$	13	14	15	
Strict Good Ordinary.....	11 $\frac{3}{4}$	12	12 $\frac{1}{2}$	13	14	15	16	16	16		10 $\frac{3}{4}$	10 $\frac{3}{4}$	11	11 $\frac{1}{2}$	12	13	14	
Good Ordinary.....	11 $\frac{3}{4}$	11 $\frac{1}{2}$	12	12 $\frac{1}{2}$	13 $\frac{1}{2}$	14	14 $\frac{1}{2}$	15	15		10 $\frac{3}{4}$	10 $\frac{1}{2}$	10 $\frac{3}{4}$	11	11 $\frac{1}{2}$	12	13	

These quotations show that the premiums are relatively higher for the grades above Middling and the penalties greater for the grades below Middling than with short cotton. Nevertheless, every additional one-sixteenth of an inch in the length of the staple usually adds as much to the market value of the cotton as does a full grade in the grading. This is especially true for staples up to 1 $\frac{3}{8}$ inches in length. There is a greater difference of opinion, however, concerning length of staple than there is concerning the grade.

Different experts vary considerably in their estimates of the length of the same sample of cotton, sometimes as much as one-fourth of an inch. This is often due, no doubt, to the fact that all do not pull the staple in the same way. A rule used for measuring the drawn sample, therefore, is not always a sure index of the length, for one classer when drawing may discard more short fibers than another. If, however, every one had the same standard sample of cotton for 1 inch, 1 $\frac{1}{8}$ inches, and 1 $\frac{1}{4}$ inches, etc., the cotton could be compared with the standard, both being pulled in the same way, and doubtless a closer estimate could be made.²

The trade realizes the need of such a standard, but the difficulty of maintaining the same standard year after year for the different lengths has in the past seemed insuperable.

In view of these difficulties, the New England terms for buying and selling cotton contain the following rule:

The classers shall not undertake to declare the length of any staple, but shall judge the length of staple of any lot of cotton submitted to them only in comparison with the length of staple of a type which has been agreed upon as a standard by the purchaser and seller, and which must be submitted with the samples of the lot in question.

¹ For a discussion of the agricultural importance of such distinctions in encouraging improvement in cotton production, see Cook, O. F., The relation of cotton buying to cotton growing, U. S. Department of Agriculture Bulletin 60, 1914.

² The length standards devised by Dr. N. A. Cobb are being utilized by the Bureau of the Census to collect data as to the amount of various lengths of staple used in American mills.

SUMMARY AND CONCLUSIONS.

The grade of a sample of cotton is determined by the quantity of leaf, dirt, sand, motes, neps, gin-cut or stringy fiber, and cut seed it contains, together with its color.

Cotton should be dry when ginned, and the saws, brushes, and other parts of the gin should be in good condition if a smooth sample is to be obtained.

Cleaners used in connection with the ginning will improve the cotton from one to two grades.

Early pickings should neither be mixed nor ginned with later pickings that are of a lower grade, since the price paid for a bale of cotton is based on the lowest grade it contains rather than on the highest grade.

Cotton should not be exposed to the weather; moisture causes it to mildew and so lowers the grade.

The new Liverpool standards, which are almost equivalent to the United States standards, go into effect September 1, 1914. The lower Liverpool grades (Fully Low Middling to Ordinary) allow more variations and contrast in color than the United States standards.

The United States official cotton grades should be carefully protected. The lid on the box containing them should be open only when a comparison is being made. Constant light and dust will render the grades unfit for use within a comparatively short time. See the grade label (fig. 16).

Low Middling, Middling, and Good Middling cover the bulk of white cotton grown in an average season, and a knowledge of these three grades is usually sufficient for the grower's use.

In the season of 1913-14 in markets using the United States standard grades, Low Middling Upland cotton of seven-eighths of an inch to 1-inch staple sold for approximately 1 cent below Middling, and Good Middling sold for five-eighths of a cent above Middling.

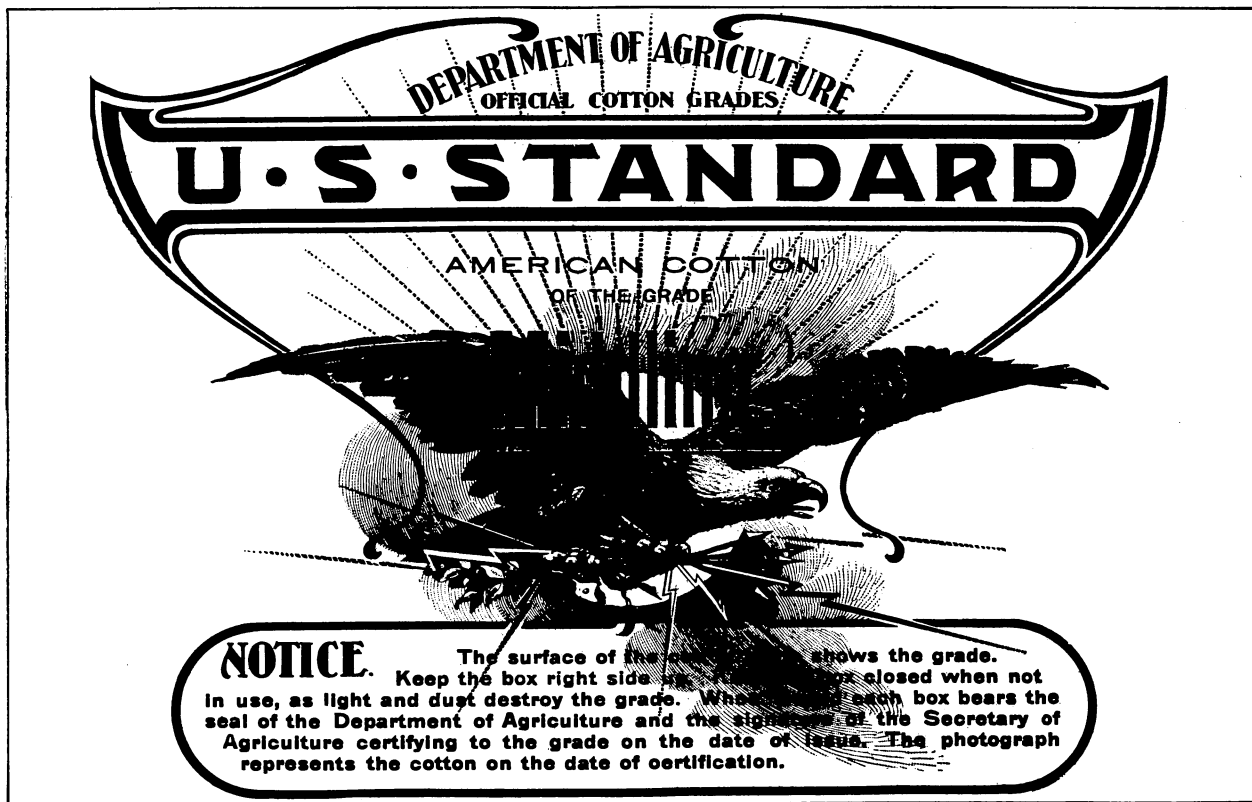


FIG. 16.—Facsimile label of the Middling type box, United States official cotton grades. Special attention is called to the directions against allowing light and dust to destroy the grade.